

Attorney Docket No. U 0186 OS/MINPT  
Serial No. 10/631,299  
Art Unit: 1742  
Applicants' RCE Submission in Response To  
the Final Action of January 20, 2006

### **REMARKS/ARGUMENTS**

#### **Amendments to the Claims**

By the above Listing of Claims, independent claims 1, 10 and 12 are amended and new claims 26-32 are added. Claims 2-8 and 13-25 are cancelled. The amended and new claims add no new matter. Upon entry of the amendments, claims 1, 9-12 and 26-32 will be pending.

Independent apparatus claim 1 is amended to clarify that it is directed to an extraction/stripping circuit design as shown in applicants' Figure 2 in which the three extraction stages are linked in series and the aqueous and organic phases are passed from extraction stage to extraction stage in countercurrent flow. Cancelled dependent claim 3 is now incorporated into amended claim 1. The amendments to the claim are supported by applicants' Figure 2 and its description in the specification at page 5, line 20 through page 6, line 7.

Independent method improvement claim 10 is also amended to clarify that it is directed to an extraction/stripping process as shown in applicants' Figure 2 in which the three extraction stages are linked in series and the aqueous and organic phases are passed from extraction stage to extraction stage in countercurrent flow. Cancelled dependent claim 3 is now also incorporated into amended claim 10. In amended claim 10 the connection of the three extraction stages is described as being "in series" as would be understood by the art-skilled person from Figure 2. The amendments to the claim are supported by applicants' Figure 2 and its description in the specification at page 5, line 20 through page 6, line 7.

Independent method improvement claim 12 is also amended to clarify that it is directed to an extraction/stripping process as shown in applicants' Figure 2 in which the three extraction stages are linked in series and the aqueous and organic phases are passed from extraction stage to extraction stage in countercurrent flow. In amended claim 12, the respective flow of the aqueous and organic phase is described in terms of the particular extraction stages one, two and three and

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the single stripping stage. The amendments to the claim are supported by applicants' Figure 2 and its description in the specification at page 5, line 20 through page 6, line 7.

New process claim 26 corresponds to cancelled process claim 14. As the examiner will see from this new version of claim 14, this step by step version of applicants' process was revised to add steps and to more clearly identify the content of the particular aqueous and organic phase involved in and produced by each step. Therefore, the undersigned attorney for applicants elected to present the revised claim in a new and uncluttered form. The first added step is step I) which sets out the extraction/strip circuit configuration (apparatuses). The second added step is step IV) which describes the flow into and out of the strip stage in more detail. New process claim 14 is supported by a combination of the general metal recovery process steps 2-7 in the specification on page 3, line 14, through page 5, line 2, and the description of both Figures 1 and 2 on page 5, line 6 through page 6, line 7.

New dependent process claims 27-32 correspond to cancelled claims 15, 16 and 21-25.

Applicants believe that the claims presented in the foregoing Listing of Claims put the application in condition for allowance and that their entry is therefore proper under 35 USC §116. Such entry and allowance, for the reasons presented in applicants' amendment paper dated December 6, 2005, and below is therefore respectfully solicited.

Alternatively, entry of the amendments presented in the Listing of Claims is believed to be proper because they put the claims in better form for appeal. Applicants submit that the amendments to the claims, being of a restrictive nature, do not present new issues which otherwise might prohibit their entry.

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**Rejections Under 35 USC §103(a) for Obviousness**

Claims 1, 9, 10-12, and 26-33, are pending in the subject application pursuant to the foregoing Amendment After Final.

The criteria for establishing a *prima facie* case of obviousness are well set out in MPEP 2142, as follows:

**MPEP 2142 Legal Concept of - 2100 Patentability**, under the second heading states the three elements needed to establish a *prima facie* case of obviousness:

**"ESTABLISHING A *PRIMA FACIE* CASE OF OBVIOUSNESS"**

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143 - § 2143.03 for decisions pertinent to each of these criteria.

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). See MPEP § 2144 - § 2144.09 for examples of reasoning supporting obviousness rejections"

(Underlining added.)

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**The Examiner has Failed to Establish the Criteria for *Prima Facie* Obviousness**

**(A) Claims 1-3, 10-12, 14-16 and 19-24 Stand Finally Rejected As Obvious Under 35 USC**

**§103(a) Over Domic et al. (US Patent No. 4,028,462).**

Applicants respectfully request reconsideration and withdrawal of this rejection in view of the amendments to the claims presented above and the following discussion of the teachings of the reference with respect to applicants' pending claims.

Applicants' claims require the specific combination of three extraction stages (in series with countercurrent flow) and only one stripping stage. As stated in MPEP 2142 above, the teaching of the prior art must be directed to all of the limitations of the claims. Applicants submit that Domic et al. specifically teaches away from only one stripping stage when three extraction stages are present. In the invention of Domic et al., two stripping stages are required with the three extraction stages in order to obtain the objective of Domic et al. to alternate the loading and unloading, i.e., extraction and stripping, functions. Thus, at col. 3, lines 56-64, Domic et al. states:

"The way to improve this driving force is to discharge partially the organic phase, before EACH EXTRACTION STEP, so the avidity of the organic phase is always maintained in a high level in such a way that its effective charge is greatly improved per cycle.

The present invention relates to a procedure intended to load or unload (partially or fully) the organic phase in an ALTERNATE manner."  
(Capitalization in the original.)

The operation of this concept is clearly shown in the Example Table of Domic et al., which shows two stripping stages for CASES a, b and c and three stripping stages for CASE d, all of which have three extraction stages (CASE b illustrates countercurrent flow as in Fig. 2, namely, with three extraction and two stripping stages.) Case d, exemplifying the inventive alternating flow of Fig. 6 thus includes 3 stripping stages with 3 extraction stages - and provides the best results.

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The invention of Domic et al. is illustrated in figures 4, 5 and 6, each of which shows in excess of three extraction stages and three stripping stages. (Exn and ELn indicate a number greater than 3.) Thus, as illustrated in Figures 4-6 and in the corresponding text at col. 4, lines 40-53, Domic et al. clearly teaches away from one stripping stage with three extraction stages. The benefits of this alternating system are stated in col. 4, line 67 through col. 5, line 10, as follows:

Experiments carried out lead to the conclusion that the economic yield of this new system of the present invention represents values that are far superior to those of the counter current flow system, and from similar to superior compared with the yields of the crossed flow system. Yet, the present system does not require additional installations and also it does not require more organic inventory than that used in the counter current system (it requires less than the crossed flow system), in spite of the fact that the recovery factor is higher and the effective load of the organic phase is higher too.

In the BACKGROUND OF THE INVENTION of Domic et al. the conventional solvent extraction process is described in the paragraph at col. 1, lines 50-66, as follows:

In the conventional solvent extraction practice, there exist two inseparable operations: the organic solvent loading and the organic solvent unloading. When the extraction steps proceed, the organic phase is loaded with the substance or substances, e.g. metallic, to be extracted from the original aqueous phase. This loading is always achieved in several and successive loading stages or contacts between the two phases till the organic phase is charged tending to the maximum thermodynamically permissible. The solvent extraction as an unit operation is still not concluded. The next successive contacts proceed between the loaded organic phase and a new aqueous phase, the stripping aqueous flow, which has distinct characteristics as the first one, in such a way that the organic phase is discharged, eluted, or stripped, and then returned to the first extraction stage, and so closing the organic circuit.

Three procedures to obtain this multiple contact in an industrial form are known for their efficiency:

(a) Co-current flow, in which the organic and the aqueous phases flow through the reactors, making contact in successive stages, in the same direction. Two circuits are used, one to load the organic (extraction) and another to unload it (stripping or elution). An outline of this procedure is shown in FIG. 1. Ac<sub>1</sub> represents the flow of aqueous



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solution subject to the extraction process.  $Ex_1$ ,  $Ex_2$  and  $Ex_3$  define the extraction reactors through which aqueous solution  $Ac_1$  flows.  $Ac_2$  is the flow of the stripping aqueous solution, and  $El_1$  and  $El_2$  indicate the elution reactors through which the latter flows. ORG. denotes the solution or organic phase that flows successively through the extraction and elution reactors. The arrows show the direction of the flow in each case.

(b) Counter current flow, in which the phases flow in opposite direction along the reactors or contact stages. Loading and unloading circuits must likewise be used. This procedure has been outlined in FIG. 2, whose symbols are the same as those of FIG. 1. It may be noticed that the direction of the flow of the extraction and stripping aqueous phases is different, compared to the organic phase flow direction.

(c) Crossed flow, in which one phase flows along the reactors going through the successive stages and the other phase flows through each stage only once, "crossing" the other flow. This procedure also requires several loading units and several stripping units. FIG. 3 depicts such a procedure. The symbols are the same as those used in FIGS. 1 and 2.

(underlining and bold added)

Applicants note that each of the described Figures 1, 2 and 3 of Domic et al. shows three successive extraction stages and two successive stripping stages - thereby also teaching away from applicants' claimed invention.

Contrary to the examiner's statement, the claims of Domic et al. also do not allow for only one stripping stage **were there are three extraction stages**. Claims 1-3 of Domic et al. clearly show the requirement for alternating extraction and stripping stages:

1. In a liquid-liquid extraction process for the extraction of a constituent from an aqueous solution through the use of an organic solvent, in which process said constituent is extracted from the aqueous feed solution into said organic solvent and backwashed into an aqueous elution solution, wherein successive extraction and successive elution contacts occur, the improvement comprising  
*partially discharging said constituent from said organic solvent through contact of said organic solvent with said aqueous elution solution after each extraction contact.*

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2. In a liquid-liquid extraction process for the extraction of a constituent from an aqueous solution through the use of an organic solvent in which process said constituent is extracted from the aqueous feed solution into said organic solvent and backwashed into an aqueous elution solution, wherein successive extraction and successive elution contacts occur, the improvement comprising *passing said organic solvent through an extraction stage after each elution stage, to charge said organic solvent with said constituent during each said extraction stage.*

3. In a liquid-liquid extraction process for the extraction of a constituent from an aqueous solution through the use of an organic solvent in which process said constituent is extracted from the aqueous feed solution into said organic solvent and backwashed into an aqueous elution solution, wherein several extraction and several elution contacts occur, the improvement comprising *flowing said organic solvent alternatively through an extraction contact and then through an elution contact, so that the loading and unloading of the organic solvent with said constituent proceeds alternatively from stage to stage.*  
(Italics added)

Claims 4, 6 and 8 of Domic et al. express the same concept in more mathematical terms - which are that: for  $n$  extraction stages there are always  $n$  elution (stripping) stages. Thus, these claims teach that with 3 extraction stages there must be 3 stripping stages - not 1 as in applicants' claims.

Applicants submit that the examiner's reading of these claims to allow a single stripping stage with three extraction stages is simply incorrect. Contrary to the examiner's statement in the final action, Domic et al. does indeed require at least two stripping stages with three extraction stages.

Even Figure 1 of Domic et al., which does not show counter current flow as in applicants' previous and amended claims, shows two stripping stages with three extraction stages. Domic et al. does not teach or suggest anything less than two stripping stages with three extraction stages - either conceptually or mathematically or by example.

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The examiner has failed to establish a *prima facie* case of obviousness because he has not shown how Domic et al. teaches or suggests all of the limitations of applicants' claims. He has not shown that Domic et al. provides any motivation to change its disclosed extraction/stripping circuit to applicants configuration. Nor, has the examiner shown that Domic et al. provides any assurance of success in making such modifications. In fact, Domic et al. teaches away from such assurance of success.

Moreover, as stated in the heading of MPEP 2144.04 II B: "Omission of an Element with Retention of the Element's Function Is an Indicia of Unobviousness." The second stripping stage is clearly needed in the Domic et al. configurations having three extraction stages. Applicants' *are the first to show* that improved metal recovery can be obtained *with the omission* of this second stripping stage in an extraction circuit configuration having three extraction stages connected in series with countercurrent flow.

For these reasons, Applicants respectfully submit that the examiner cannot establish a *prima facie* case of obviousness of the combination of three extraction stages with one stripping stage in rejected claims 1-3, 10-12, 14-16 and 19-24, or in the amended and new claims 1, 9-12 and 26-33 submitted herein, over Domic et al. Applicants therefore respectfully request withdrawal of the rejection under 35 USC §103(a) for obviousness over Domic et al.

(B) Claims 1-3, 9-12, 14-16 and 19-25 Stand Finally Rejected For Obviousness Over Lower (US Patent No. 3,429,694) and Pang (US Patent No. 3,697,400).

The examiner states that both Lower, in the embodiment of Figure 1, and Pang, also in the embodiment of Figure 1, "teach a method and apparatus for counter current solvent extraction of copper values comprising at least 3 counter current extraction stages, a wash, or filter stage and a strip stage, thereby showing all aspects of the above claims, except the use of only a single strip stage and three extraction stages." (emphasis added)



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As stated above, without the teaching or suggestion of the combination one stripping stage with three extraction stages, as required by the limitations of applicants' claims, neither Pang nor Lower nor their combination can establish a *prima facie* case of obviousness.

In the final action the examiner states: "Again, neither Lower or Pang require any specific number of stripping or extraction stages, and cannot be limited as to what they teach by their preferred embodiments, and in the claims of each of Lower and Pang, for example, only a single stripping stage is required." Applicants submit that the claims do not teach or suggest anything about the number of either "extraction stages" or "stripping stages". Thus, one must rely upon the teachings of the specification and drawings of Pang and Lower as to what they *suggest* about the number of extraction and stripping stages *and the combinations thereof*. Applicants claims are directed to a particular combination of extraction and stripping stages, and *it is this combination* which must be suggested by the combined teachings of the prior art references.

The claims of both Lower and Pang refer only to "extracting" and "stripping" and *are silent with respect to "extraction stages" or "stripping stage" or the number of either*. Thus, any inferences about the number and combination of extraction stages and stripping stages must be drawn from the specification and drawings of each reference.

The only mention in the specification of Lower of the number of extraction stages and stripping stages is in the two examples. In both examples *four* extraction stages and *four* stripping stages are used - as in the Drawing of Lower. Thus, there is *no basis in Lower* for a suggestion that either three extraction stages or one stripping stage be used - let alone a basis for a suggestion of this exact combination of extraction and stripping stages. (The primary reason for this is that the invention and disclosure of Lower are directed primarily to extractants for extraction of copper cyanide and not to the extraction or stripping processes or circuits or stages themselves.)

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The only mention in the specification of Pang of the number of extraction and stripping stages is in examples 9 and 10. In example 9, *five* extraction stages and *two* stripping stages are used.

Example 9 of Pang, at col. 12, lines 30-37 and 43-45 states further:

The number of stages of countercurrent extraction varies with the type of equipment, and other flow sheet details. For conventional type extractors, from 3 to 9 stages normally can be considered as an economical range for either AMQA-solvent of copper or for the strong acid stripping of copper from the copper loaded chelate to form the electrolytic cell feed."

With more stages, a more completely copper loaded solvent phase, or strong acid phase is obtainable, but the cost of equipment is higher.

(underlining added)

Example 10 of Pang refers to the drawing which shows *four* extraction stages in combination with *four* stripping stages - as in Lower. Thus, there is *no basis in Pang* for a suggestion that either three extraction stages or one stripping stage be used - let alone for a suggestion of this exact combination of extraction stages and stripping stages. (In Pang the invention and disclosure are also directed primarily to the extractants and not the extraction or stripping processes themselves.)

The art as whole, i.e. Lower and Pang in this obviousness rejection, at best teaches a combination of four or five extraction stages with two or four stripping stages. The two statements at the end of example 9 in Pang *reinforce this specific teaching of both more extraction and more stripping stages than in applicants' claimed combination.*

The examiner has failed to establish a *prima facie* case of obviousness because he has not shown how Lower and Pang, individually or taken together, teach or suggest all of the limitations of applicants' claims. He has not shown that Lower and Pang provide any motivation to change their disclosed extraction/stripping circuit to applicants' 3/1 configuration. Nor, has the examiner shown that Lower and Pang, either individually or taken together, provide any

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assurance of success in making such modifications. In fact, Lower and Pang each teach away from such assurance of success.

For these reasons, Applicants respectfully submit that the examiner cannot establish a *prima facie* case of obviousness of the combination of three extraction stages with one stripping stage in their rejected claims 1-3, 9-12, 14-16 and 19-25, or in the amended and new claims 1, 9-12 and 26-32 submitted herein, over the combination of Lower and Pang. Applicants therefore respectfully request withdrawal of the rejection under 35 USC §103(a) for obviousness over Lower and Pang.

*Applicants submit further that "the art as a whole" in this case includes Domic et al., Lower and Pang even though they are not combined in a single rejection. Domic et al. is the most relevant to applicants' claimed combination of three extraction and one stripping stage because its invention and disclosure are directed to the number and configuration of extraction and stripping stages. However, as noted above, its teaching precludes applicants' claimed combination. Applicants submit that Lower and Pang further teach away from their claimed combination by teaching the desirability of both more extraction and more stripping stages than in applicants' claimed combination. Thus, withdrawal of the rejections for obviousness is further solicited because the "art as a whole" from both rejections fails to establish a prima facie case of obviousness, and, in fact, teaches away from applicants' claimed invention. Additionally, the three references predate applicants' filing date by 25 years and more, which applicants submit is a further indication of the unobviousness of their invention.*

Applicants believe that the foregoing amendments and Remarks/Arguments constitute a complete response to the rejection in the Final Action of January 20, 2006, and that all grounds of rejection are completely avoided and/or overcome. Applicants therefore respectfully request that a timely Notice of Allowance be issued in this application.

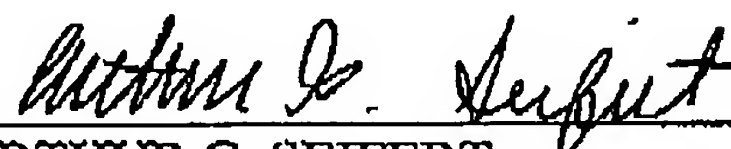
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The Examiner is requested to telephone the undersigned attorney if any further questions remain  
which can be resolved by a telephone interview.

Respectfully submitted,

**GARY A. KORDOSKY, et al.**

May 22, 2006  
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